

Insulating a Roof with Solar Paint

One weatherization agency's experience with a new product

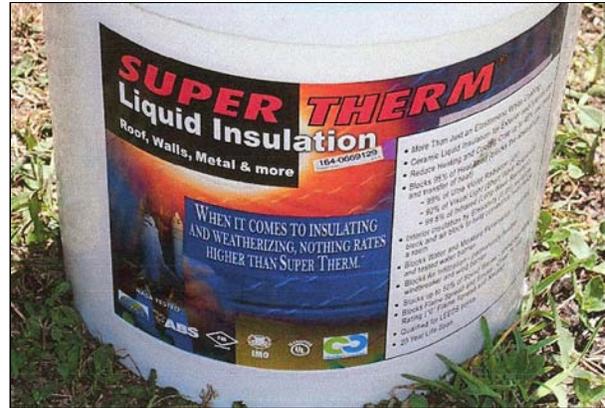
The St. Johns Housing Partnership is a private, nonprofit agency in St. Augustine, Florida, that promotes safe, decent, and affordable housing. The repair and weatherization of single-family and multi-family residences are a main focus of our work.

In addition to residents' security and comfort, a specific intent is to reduce residents' utility bills. Toward this, we occasionally have the opportunity to experiment with new products and technologies. Recently, SJHP experimented with a new "green" product: SUPERTHERM®—a liquid insulation that blocks the loading of solar heat on roofs. Interior building and ceiling temperatures are said to drop within minutes of applying SUPERTHERM® to the roof surface—and even more over days when the application cures. As its promo reads: "SUPERTHERM® is leading the green movement by turning black roofs into insulating white roofs." And you just paint it on!

As primarily a roof coating, the product can be used on any roof surface—wood, metal, or tile—when used with a recommended primer product. The manufacturer suggests that SUPERTHERM® can also be used to insulate interior ceilings and walls.

We applied SUPERTHERM® to the 14x60-foot metal roof of an older single-wide mobile home and took comparison readings of "before" and "after" temperatures to see what impact this insulating product has on reducing interior temperatures and utility costs. The mobile home's roof had not been cleaned in years. First, we pressure washed the roof to clear it of debris, dirt, and fungus, common in the hot humid Florida climate. Then we applied SUPERTHERM® with paint rollers. Even our high school intern was able to apply the paint with ease.

SUPERTHERM® is a multi-ceramic coating that combines high-performance urethanes and acrylics with resin additives in a waterborne formula. The product is available at The Home Depot Store. The only care required in application is to ensure the film thickness in order for the coating to be effective. SUPERTHERM® should be applied at 18 mils wet and never less than 10 mils dry. The coating dries within one hour in 70° F and bright sun. Always allow for two hours of direct sunlight to properly dry after application. While we used



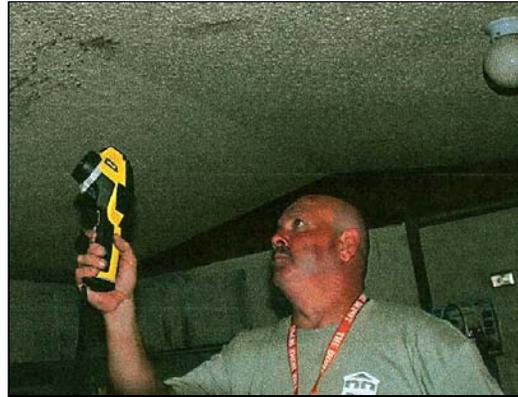
regular paint rollers, it can be applied with a paint sprayer, but *remove all filters when using a sprayer*. According to the manufacturer, the product fully “cures” in 21 days.

The SJHP’s interest in SUPERTHERM® as an insulating paint was to test its promise of reducing heating and cooling costs by up to 70%. The manufacturer states that “SUPERTHERM® blocks 95% of the three sources of heat: visual light, ultra-violet rays, and infrared rays. The surface temperature of a roof will always be within 5 degrees of ambient temperature, once SUPERTHERM® is applied. The manufacturer claims additional benefits of SUPERTHERM® to reduce water and moisture penetration, prevent mold and mildew, and reduce air infiltration—all important features to weatherization work.

According to its MSD reports, SUPERTHERM® is water based and environmentally friendly. Its volatile organic compounds (VOCs) are only 21 grams per liter when the safety limit is 420 grams. SUPERTHERM® is also 11.9 times less toxic than typical latex paint, whose VOCs are 250 grams per liter.

To measure the effectiveness of SUPERTHERM® for lowering interior temperatures, we took readings with an infrared camera. We used a Flir B40 thermal imaging infrared camera pointed at the ceiling from a distance of 3.3 feet. This camera has an image resolution of 14,400 pixels (120x120) and its optimized temperature range is -4° F to 248° F when targeting building applications.

Because inside temperatures are claimed to drop within minutes, we took initial readings of a portion of the mobile home’s roof painted with SUPERTHERM® compared with a portion of the roof not painted. We saw an immediate drop of 7° F. For a more extensive comparison of temperature differentials, we took interior photos throughout the mobile home before we applied the product and then returned two days later under similar weather conditions and took additional photos from the same interior locations. The differential among the set of nine before-and-after photos ranged from 7.9 to 12.5 degrees Fahrenheit—an average reduction of 10.2°F.



Data in the following table reflect the differentials in the infrared photos that follow.

PHOTO LOCATION	TEMPERATURES ° F		DIFFERENTIAL
	<i>BEFORE 5/26/11</i>	<i>AFTER 5/28/11</i>	
<i>within mobile home</i>			
kitchen ceiling northwest side	84.7	73.0	11.7
kitchen on west side	84.6	72.1	12.5
kitchen ceiling at center	82.6	72.9	9.7
bathroom ceiling	83.7	73.8	9.9
living room southeast ceiling	83.6	72.4	11.2
living room ceiling at center	82.8	74.1	8.7
east bedroom at ceiling fan	83.8	75.9	7.9
east bedroom ceiling	83.7	73.9	9.8
west bedroom ceiling	84.6	74.3	10.3

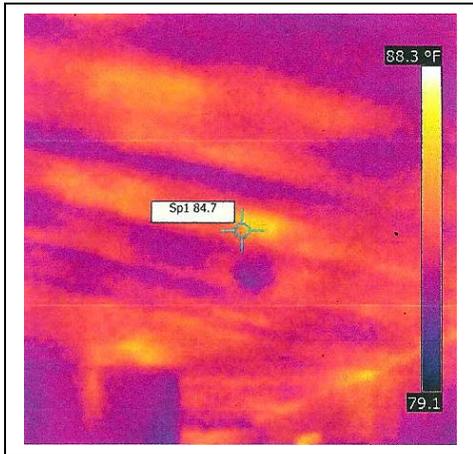
Average differential is 10.2 degrees Fahrenheit.

For all entries, reflected apparent temperature was 68.0° F and emissivity was 0.98.

Photographs were taken with a Flir B40 Thermal Imaging Infrared Camera. Object distance was 3.3 feet.



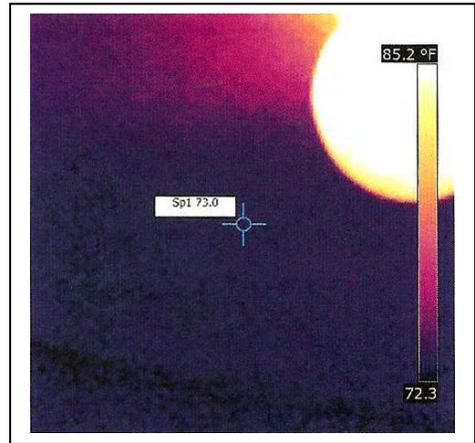
BEFORE 84.7°F



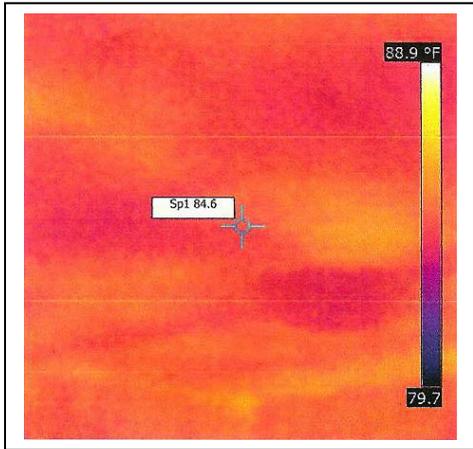
Kitchen ceiling on NW side

11.7°F differential

AFTER 73.0°F



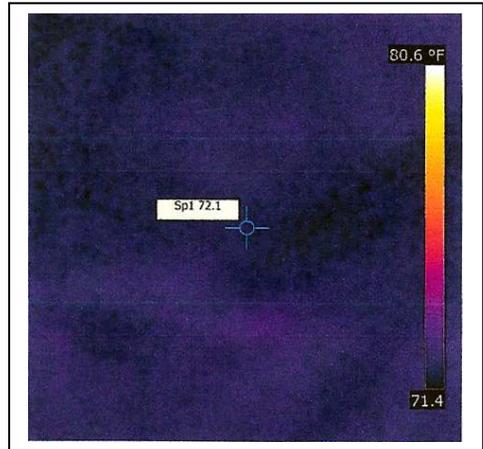
BEFORE 84.6°F



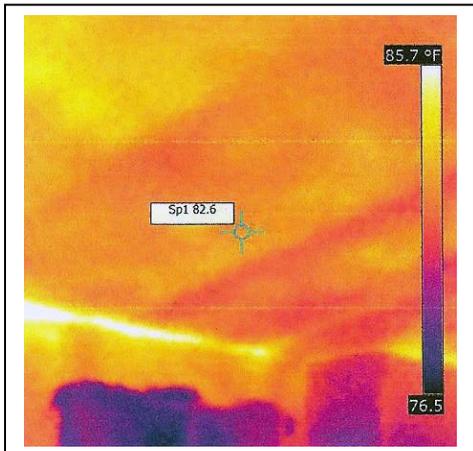
Kitchen on west side

12.5°F differential

AFTER 72.1°F



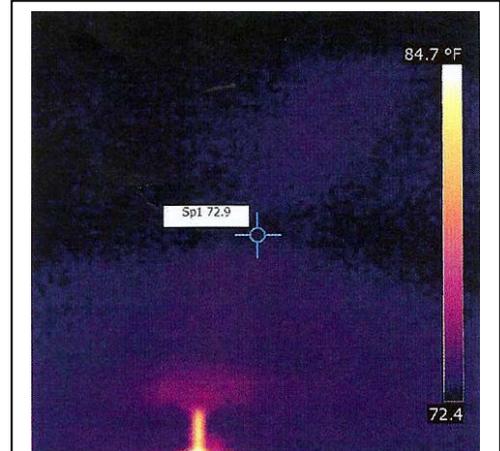
BEFORE 82.6°F



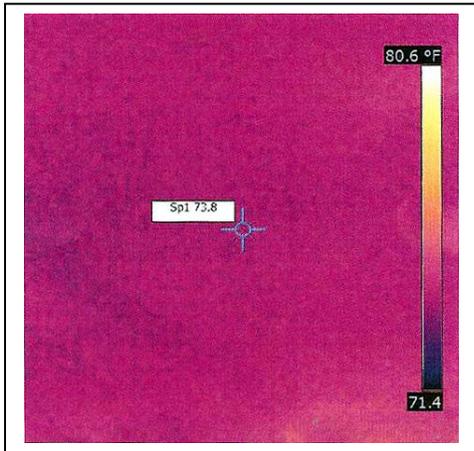
Kitchen ceiling at center

9.7°F differential

AFTER 72.9°F



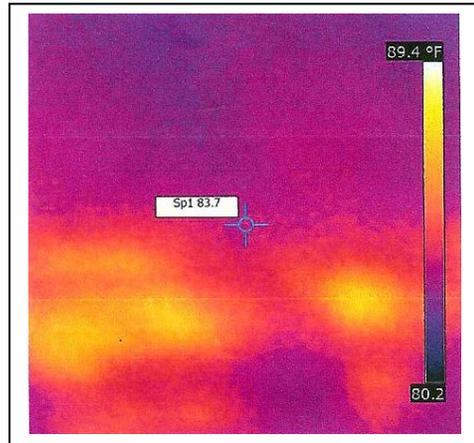
BEFORE 83.7°F



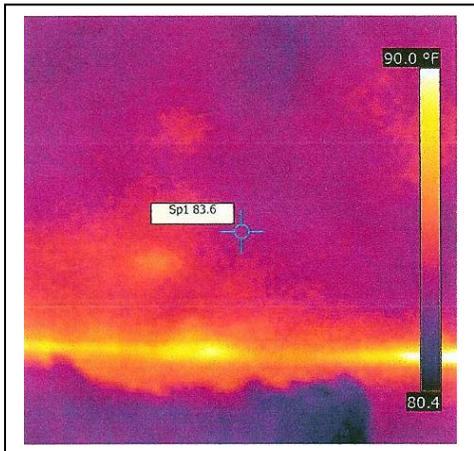
Bathroom ceiling

9.9°F differential

AFTER 73.8°F



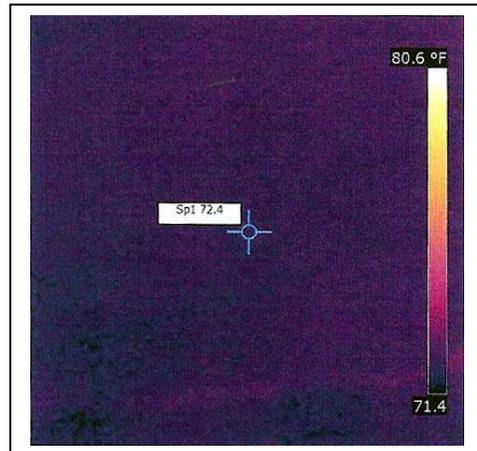
BEFORE 83.6°F



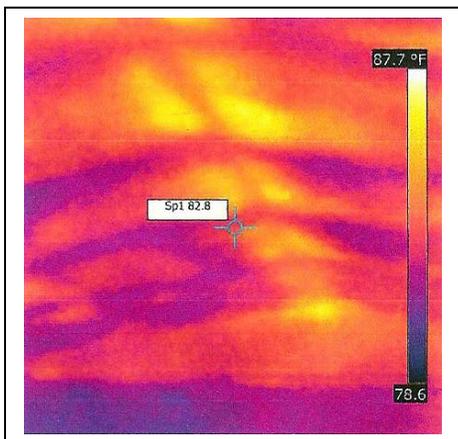
Living room SE ceiling

11.2°F differential

AFTER 72.4°F



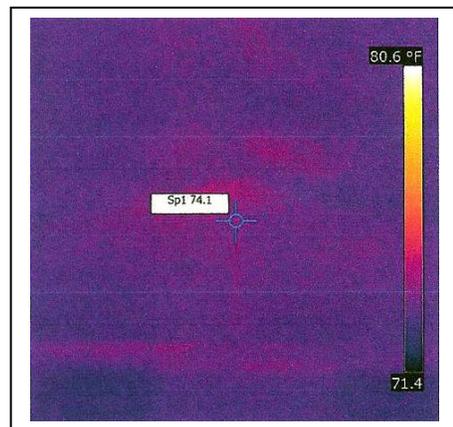
BEFORE 82.8°F



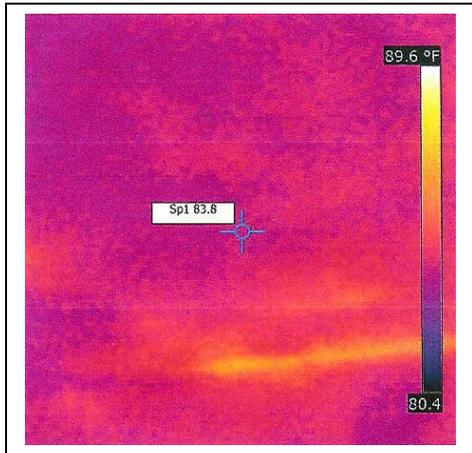
Living room ceiling at center

8.7°F differential

AFTER 74.1°F

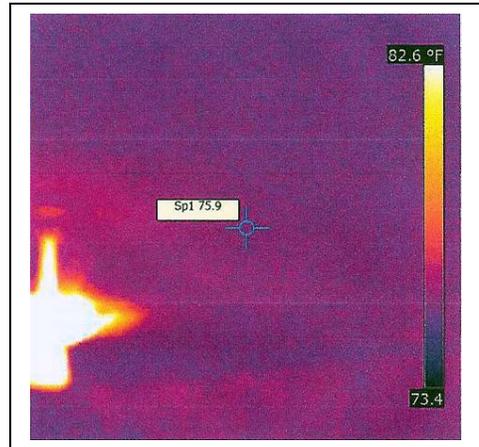


BEFORE 83.8°F

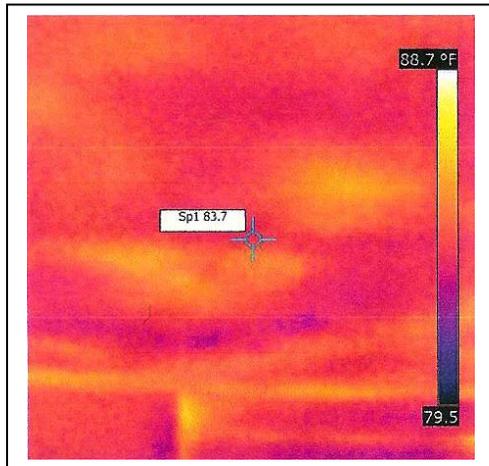


East bedroom at ceiling fan
7.9°F differential

AFTER 75.9°F

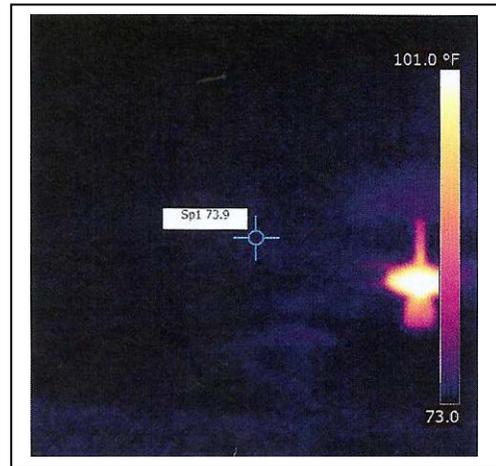


BEFORE 83.7°F

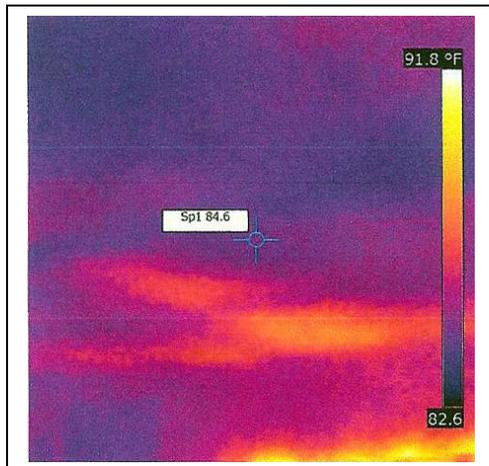


East bedroom ceiling
9.8°F differential

AFTER 73.9°F

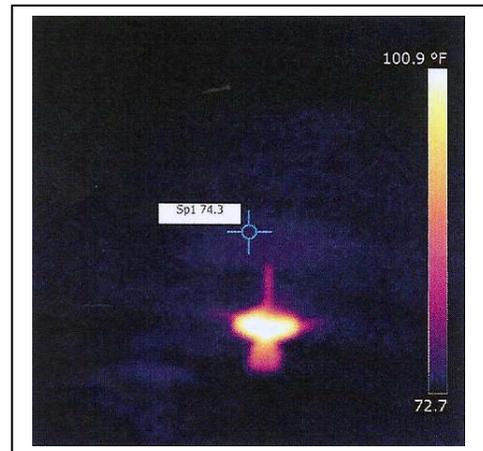


BEFORE 84.6°F



West bedroom ceiling
10.3°F differential

AFTER 74.3°F



The application of SUPERTHERM®, although labor intensive, did not take long: 2 hours to pressure wash the roof the day before and 4 hrs for two employees to apply the paint. A 5-gallon bucket of SUPERTHERM® covers about 100 square feet per gallon at a cost of \$100 per gallon.

The exterior surface temperature of the mobile home's metal roof on a windy 85° F day was 164° F. After application, the surface temperature dropped to 86° F. When we measured the roof surface temperature of a similar mobile home whose roof SJHP had coated with a white elastomeric product, the exterior surface temperature of that roof was 125° F.

When SJHP weatherization auditors returned to the original mobile home a week after our experiment with SUPERTHERM®, *the owner reported that she had not turned on her A/C unit since the day the roof was coated.* The interior temperature was comfortable, which offers a tremendous savings for this particular elderly mobile homeowner, who carefully watches her expenses in order to purchase necessary medications.

Follow-up measurements may be taken in the weeks after application to verify additional readings. Even without further readings, SJHP's assessment to date is that SUPERTHERM® works well and meets our purpose and budget. It was relatively easy to apply and does not require significant application skills, other than normal diligence and care. We were very impressed with the immediate temperature changes after application.

